

Draft Document for Board Review. Not for Public comment.

Atlantic States Marine Fisheries Commission

**DRAFT ADDENDUM V TO THE AMERICAN EEL FISHERY
MANAGEMENT PLAN**

Commercial Yellow and Glass/Elver Eel Allocation and Management



This draft document was developed for Management Board review and discussion.

This document is not intended to solicit public comment as part of the Commission/State formal public input process. Comments on this draft document may be given at the appropriate time on the agenda during the scheduled meeting. If approved, a public comment period will be established to solicit input on the issues contained in the document.

ASMFC Vision:

Sustainably Managing Atlantic Coastal Fisheries

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1.0 Introduction

The Atlantic States Marine Fisheries Commission (Commission) has coordinated interstate management of American eel (*Anguilla rostrata*) from 0-3 miles offshore since 2000. American eel is currently managed under the Interstate Fishery Management Plan (FMP) and Addenda I-IV to the FMP. Management authority in the exclusive economic zone (EEZ) from 3-200 miles from shore lies with NOAA Fisheries. The management unit is defined as the portion of the American eel population occurring in the territorial seas and inland waters along the Atlantic coast from Maine to Florida. The Commission's American eel Management Board (Board) approved the following motions on October 17, 2017:

Move to initiate an addendum to consider alternative allocations, management triggers, and coastwide caps relative to the current management program for both the yellow and glass eel commercial fisheries starting in the 2019 fishing season.

This Draft Addendum proposes alternate commercial quota and aquaculture provisions for glass eels (both glass and elvers); and alternative management triggers, coastwide landings caps, and commercial allocations for the yellow for eel fishery.

2.0 Overview

2.1 Statement of Problem

The Commission's Interstate Fisheries Management Program (ISFMP) Charter establishes fairness and equity as guiding principles for the conservation and management programs set forth in the Commission's FMPs. Allocations for the commercial fisheries of American eel have strived to achieve these principles through Addendum IV to the American eel FMP. In 2014, Addendum IV outlined a new coastwide commercial quota system for yellow and glass/elver life stage fisheries for American eel. Specifically for the yellow eel fishery, Addendum IV set an annual commercial coastwide quota (referred to as the Coastwide Catch Cap) of 907,671 pounds that included two management triggers:

1. The coastwide catch cap is exceeded by more than 10% in a given year (998,438 pounds); or
2. The coastwide catch cap is exceeded for two consecutive years, regardless of percent overage. Exceeding one of the two triggers would result in automatic implementation of state-by-state quotas.

Since the implementation of Addendum IV, states have raised several concerns about the current management structure. The management trigger that is tripped if there is a second-year overage of any amount is troublesome to some jurisdictions given the inherent uncertainty of the landings data. The FMP requires states to report commercial landings by life stage, gear type, month, and region although not all states were able to provide this level of information for either the benchmark (2012) or updated (2017) stock assessment. In addition to not always having a complete data set to distinguish landings by life stage, there are other potential biases present in the commercial yellow eel data set. At least a portion of commercial American eel landings are from non-marine waters.

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Even with mandatory reporting, those requirements do not always extend outside marine districts. Additionally, misreporting between conger eel, hagfish, slime eel, and American eel has been known to occur. Despite these uncertainties, the commercial landings do represent the best data available and are indicative of the trend of total landings over time.

Estimated landings indicate that the Coastwide Cap was exceeded by less than 10% in 2016. Therefore, if the coastwide cap is exceeded by any amount in 2017, state by state quotas would be implemented. Many have expressed concern that a small overage in 2017 could result in significant economic consequences for multiple jurisdictions. States have also expressed concern that current Coastwide Cap is independent of any ability to quantify the amount of change in landings necessary to effect fishing mortality rates and spawning stock status. Neither of those stock status elements are currently calculated for American eel due to a lack of data. Finally, states have expressed concern that moving to state-specific quotas for the American eel yellow life stage fishery would create a new administrative burden. Finally, equitable allocation of this resource is particularly difficult given the variation in the availability of the resource and the market demand for eels up and down the East coast.

For the glass life-stage eel fishery, Addendum IV specified an annual glass eel commercial quota for Maine of 9,688 pounds for the 2015-2017 fishing seasons and that it be re-evaluated after 3 years (prior to the start of the 2018 fishing season). The state of Maine has expressed interest in increasing their glass eel quota, which requires a new addendum.

2.2 Background

American eel inhabit fresh, brackish, and coastal waters along the Atlantic, from the southern tip of Greenland to Brazil. American eel eggs are spawned and hatch in the Sargasso Sea. After hatching, leptocephali—the larval stage—are transported to the coasts of North America and the upper portions of South America by ocean currents. Leptocephali then transform into glass eels via metamorphosis. In most areas, glass eel enter nearshore waters and begin to migrate up-river, although there have been reports of leptocephali found in freshwater in Florida. Glass eels settle in fresh, brackish, and marine waters; where they undergo pigmentation, subsequently maturing into yellow eels.

The ASMFC American Eel Management Board (Board) first convened in November 1995 and finalized the Interstate Fishery Management Plan (FMP) for American Eel in November 1999 (ASMFC 2000a). The goal of the FMP is to conserve and protect the American eel resource to ensure its continued role in the ecosystems while providing the opportunity for its commercial, recreational, scientific, and educational use (ASMFC 2000a). The FMP requires all states and jurisdictions to implement an annual young-of-year (YOY) abundance survey to monitor annual recruitment of each year's cohort

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(ASMFC 2000a, 2000b). In addition, the FMP requires a minimum recreational size and possession limit and a state license for recreational harvesters to sell eels. The FMP requires that states and jurisdictions maintain existing or more conservative American eel commercial fishery regulations for all life stages, including minimum size limits. Each state is responsible for implementing management measures within its jurisdiction to ensure the sustainability of its American eel population.

Since the FMP was approved in 1999 it has been modified 4 times. Addendum I (approved in February 2006) established a mandatory catch and effort monitoring program for American eel. Addendum II (approved in October 2008) made recommendations for improving upstream and downstream passage for American eels. Most recently, Addendum III (approved in August 2013) made changes to the commercial fishery, specifically implementing restrictions on pigmented eels, increasing the yellow eel size limit from 6 to 9 inches, and reducing the recreational creel limit from 50 fish to 25 fish per day. In October 2014, the Board approved Addendum IV which set goals of reducing overall mortality and maximizing the conservation benefit to American eel stocks (ASMFC 2014). The Addendum established a coastwide cap of 907,671 pounds of yellow eel, reduced Maine's glass eel quota to 9,688 pounds (2014 landings), and allowed for the continuation of New York's silver eel weir fishery in the Delaware River. For yellow eel fisheries, the Coastwide Cap was implemented starting in the 2015 fishing year and established two management triggers: (1) if the Coastwide Cap is exceeded by more than 10% in a given year, or (2) the Coastwide Cap is exceeded for two consecutive years regardless of the percent overage. If either one of the triggers are met then states would implement state-specific allocation based on average landings from 1998-2010 with allocation percentages derived from 2011-2013.

The objectives of Draft Addendum V are to:

- 1) Re-evaluate Maine's glass/elver eel quota based on updated information;
- 2) Re-evaluate the coast-wide cap and management triggers to include recent fishery performance and updated landings data, and to ensure the overarching goal of the FMP - *to conserve and protect the American eel resource to ensure its continued role in the ecosystems while providing the opportunity for its commercial, recreational, scientific, and educational use* - is met; and
- 3) Address allocation issues including difficulties in equitable allocation and the administrative burden that would result from state by state quotas.

2.3 Description of the Fishery

2.3.1 Glass Eel/Elver Fishery

Life stage glass and elver eel harvest along the Atlantic coast is prohibited in all states except Maine and South Carolina. In recent years, Maine was the only state reporting substantial glass eel or elver harvest.

Since the implementation of the 9,688 pound glass eel quota for Maine in 2015 through Addendum IV, landings have tracked close to the quota. In 2016 and preliminary 2017 landings information indicate that >94% of the quota based on preliminary landings information) after being much lower in 2015 (5,260 pounds).

Table 1. Maine's Glass/Elver Eel Landings 2007-2017 (Source: ACCSP)

Year	Landings	Value
2007	3,714	\$1,287,479
2008	6,951	\$1,486,353
2009	5,199	\$514,629
2010	3,158	\$592,405
2011	8,585	\$7,656,345
2012	21,610	\$38,791,627
2013	18,081	\$32,926,991
2014	9,688	\$8,440,333
2015	5,260	\$11,389,891
**2016	9,399	\$13,388,040
**2017	9,282	>\$12,000,000

**Preliminary landings

Prior to the implementation of the FMP, Maine was the only state compiling glass eel and elver fishery catch statistics. Under the FMP, all states are now required to submit fishery-dependent information. In 2013, the Maine Department of Marine Resources (MEDMR) began to develop a swipe card system that would allow dealers to enter daily data quickly and allow MEDMR staff to analyze that data within 24 hours of receipt, fishery management tool to implement an individual fishery quota (IFQ) for harvesters. The original harvester-to-dealer system was expanded in 2015 to include dealer-to-dealer transactions. Since 2014, the MEDMR has been able to effectively track the individual quotas of approximately 900 active harvesters each season as well as the overall quota.

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In a two-year period, over 23,000 card swipes did not need to be entered by MEDMR staff, and only two card failures were reported. In addition, the number of fishery related infractions reported by the Marine Patrol dropped from over 200 in 2013 to under 20 in 2014 through 2016. The addition of the dealer-to-dealer swipe card program resulted in a difference of just over 120 pounds (approximately 2%) between what dealers reported purchasing directly from harvesters to what was exported from Maine dealers in 2015. These 120 pounds is likely attributed to shrinkage (die off between initial purchase to final shipment) and did not raise concerns for MEDMR staff.

Given their high market value, poaching of glass eels and elvers is known to be a serious problem in several states. Enforcement of the regulations is challenging due to the nature of the fishery (very mobile, nighttime operation, and high value for product). However, the recent cooperation between the State enforcement agencies and the USFWS remains a high priority and has resulted in several convictions for violation of the Lacey Act.

Addendum IV to the FMP also allows approved Aquaculture Plans from states and jurisdictions to harvest up to 200 pounds of glass/elver eel annually from within their state waters for use in domestic aquaculture activities. The American Eel Farm (AEF) in North Carolina is the only facility to have applied and approved for domestic aquaculture, which they have done annually since 2016. Fishing did not take place in 2016 due to permitting issues in North Carolina. In 2017, a total of 0.25 pounds of glass eels were harvested of the 200 pound quota. North Carolina Division of Marine Fisheries submitted an amended plan on behalf of AEF for 2018-2020 which was approved by the Board in August 2017.

2.3.2 Yellow Eel Fishery

Coastwide description

Yellow eel landings have varied considerably over the years due to a combination of market trends and availability. These fluctuations are evident both within states and jurisdictions, as well as at a regional level. Such fluctuations pose significant management challenges with regard to balancing sustainable landings and access to the resource with economic considerations. Over the last 19 years, total coastwide landings have ranged from a low of approximately 717,698 pounds in 2002 to a high of approximately 1,189,455 pounds in 2011. State reported landings of yellow/silver eels in 2016 totaled 943,808 pounds (Table 2), which represent an 8.7% increase in landings from 2015 (868,122 pounds). Yellow eel landings increased in Rhode Island, Connecticut, and Maryland through Virginia but decreased in all other states and jurisdictions.

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Table 2. State by state Yellow Eel Landings: 1998-2016. Source: Personal communication from State and Jurisdictions, January 2018.

Year	ME	NH	MA	RI	CT	NY	NJ	DE	MD	PRFC	VA	NC	SC	GA	FL	Total
1998	0	Time series average of less than 400 pounds	3,456	967	5,606	16,867	94,327	131,478	301,833	209,008	123,837	91,084	Time series average of less than 400 pounds	Time series average of less than 400 pounds	13,819	992,741
1999	0		3,456	140	10,250	7,882	90,252	128,978	305,812	163,351	183,255	99,939			17,533	1,011,093
2000	0		2,976	25	4,643	5,824	45,393	119,180	259,552	208,549	114,972	127,099			6,054	894,577
2001	9,007		3,867	14,357	1,724	18,192	57,700	121,515	271,178	213,440	97,032	107,070			14,218	929,523
2002	11,617		3,949	22,965	3,710	30,930	64,600	99,529	208,659	128,595	75,549	59,940			7,587	717,698
2003	15,312		4,047	24,883	1,868	8,296	100,701	155,516	346,412	123,450	121,091	172,065			8,486	1,082,614
2004	29,646		5,328	19,858	1,374	5,354	120,607	137,489	273,142	116,263	123,812	128,875			7,330	969,318
2005	17,189		3,073	22,001	337	27,726	148,127	111,200	378,659	103,628	66,956	49,278			3,913	932,087
2006	27,489		3,676	1,034	3,443	10,601	158,917	123,994	362,966	83,622	82,756	33,581			1,248	894,192
2007	14,251		2,853	1,230	935	14,881	169,902	139,647	343,141	97,361	56,512	37,937			7,379	886,470
2008	3,882		3,297	8,866	6,046	15,025	137,687	80,002	381,993	71,655	84,031	23,833			15,624	832,475
2009	2,285		1,217	4,855	435	12,676	118,533	59,619	335,575	58,863	117,974	65,481			6,824	784,420
2010	2,605		322	3,860	167	12,179	105,089	69,355	524,768	57,755	77,263	122,104			11,287	986,937
2011	2,666		368	2,038	60	36,451	120,576	92,181	715,162	29,010	103,222	61,960			25,601	1,189,455
2012	12,775		462	1,484	2,228	35,603	113,806	54,304	590,412	90,037	121,605	64,110			11,845	1,100,881
2013	4,596		2,499	2,244	546	42,845	90,244	82,991	587,872	32,290	100,379	33,980			15,059	997,052
2014	4,320		3,903	2,353	1,390	38,143	91,225	62,388	619,935	49,293	109,537	60,755			14,092	1,057,467
2015	3,559	2,255	1,538	2,271	50,194	88,828	44,708	493,043	31,588	86,715	57,791	5,632	868,122			
2016	4,509	1,705	2,651	2,445	36,371	67,422	44,558	583,578	58,223	96,336	39,911	6,034	943,808			

Note: Due to data confidentiality rules, annual landings for New Hampshire, South Carolina, and Georgia are not shown rather the time series landings average of less than 400 pounds.

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State by state descriptions

The yellow American eel fishery in Maine occurs in both inland and tidal waters. Yellow eel fisheries in southern Maine are primarily coastal pot fisheries managed under a license requirement, minimum size limit, and gear and mesh size restrictions. New Hampshire has monitored its yellow eel fishery since 1980; reporting effort in the form of trap haul set-over days for pots or hours for other gears has been mandatory since 1990. Small-scale, commercial eel fisheries occur in Massachusetts and Rhode Island and are mainly conducted in coastal rivers and embayments with pots during May through November. Connecticut has a similar small-scale, seasonal pot fishery for yellow eels in the tidal portions of the Connecticut and Housatonic rivers. All New England states presently require commercial eel fishing licenses and maintain trip-level reporting.

Licensed eel fishing in New York occurred primarily in Lake Ontario (prior to the 1982 closure), the Hudson River, the upper Delaware River (Blake 1982), and in the coastal marine district. A slot limit (greater than 6 inches and less than 14 inches to limit PCB exposure) exists for eels fished in the tidal Hudson River (from the Battery to Troy and all tributaries upstream to the first barrier), strictly for use as bait or for sale as bait only. Due to PCB contamination of the main stem, commercial fisheries have been closed on the freshwater portions of the Hudson River and its tributaries since 1976. The fishery in the New York portion of the Delaware River consists primarily of silver eels collected in a weir fishery. In 1995, New York approved a size limit in marine waters. New Jersey fishery regulations require a commercial license, a minimum mesh, and a minimum size limit. A minimum size limit was set in Delaware in 1995. Delaware mandated catch reporting in 1999 and more detailed effort reporting in 2007.

Maryland, Virginia, and Potomac River Fisheries Commission have primarily pot fisheries for American eels in Chesapeake Bay. Large eels are exported whereas small eels are used for bait in the crab trotline fishery. Catch reports were not required in Virginia prior to 1973 and Maryland did not require licenses until 1981. Effort reporting was not required in Maryland until 1990. The Potomac River Fisheries Commission has had harvester reporting since 1964, and has collected eel pot effort since 1988.

North Carolina has a small, primarily coastal pot fishery that fluctuates with market demands. The majority of landings come from the Albemarle Sound area and additional landings reported from the Pamlico Sound and "other areas." No catch records are maintained for freshwater inland waters, and no sale of eels harvested from these waters is permitted. Landings for "other areas" reported by the state come from southern waterbodies under the jurisdiction of NCDMF. South Carolina instituted a permitting system over ten years ago to document total eel gear and commercial landings. Pots and traps are permitted in coastal waters for yellow eel life stage fishery; other gear types such as fyke nets and dip nets are permitted for glass eels.

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American eel fishing in Georgia was restricted to coastal waters prior to 1980 when inland fishing was permitted (Helfman et al. 1984). Catch data are available, but effort data is not because no specific license is required to fish eels. The Florida pot fishery has a minimum mesh size requirement in the fishery and it is operated under a permit system.

2.4 Status of the Stock

The last peer reviewed and accepted benchmark stock assessment was approved for management use in 2012. Analyses and results indicated that the American eel stock had declined and that there were significant downward trends in multiple surveys across the coast. It was determined that the stock was depleted but no overfishing determination could be made based on the analyses performed.

The 2012 benchmark stock assessment was updated in 2017 with data through 2016. All three trend analysis methods (Mann-Kendall, Manly, and ARIMA) detected significant downward trends in some indices. The Mann-Kendall test detected a significant downward trend in six of the 22 YOY indices, five of the 15 yellow eel indices, three of the nine regional trends, and the 30-year and 40-year yellow-phase abundance indices. The remaining surveys tested had no trend, except for two which had positive trends. The Manly meta-analysis showed a decline in at least one of the indices for both yellow and YOY life stages. For the ARIMA results, the probabilities of being less than the 25th percentile reference points in the terminal year for each of the surveys were similar to those in ASMFC 2012 and currently three of the 14 surveys in the analysis have a greater than 50% probability of the terminal year of each survey being less than the 25th percentile reference point. Overall, the occurrence of some significant downward trends in surveys across the coast remains a cause for concern and the assessment maintained that the stock remains depleted.

3.0 Proposed Management Program

The following options were developed from the Board motion from October 2017. The American Eel Allocation Working Group (Allocation WG) provided additional information for the Board to consider in selecting, removing, or further developing the options below. Again, these options can be further modified by the Board. The following options are organized by the specific life stage fishery and issue item.

3.1 Proposed Options for Maine Glass Eel Quota

Note: This addendum proposes changes to Maine's glass/elver eel quota as specified in Addendum IV. The following items remain a component of the commercial glass/elver eel fishery management program:

- **Quota Overages:** For any state or jurisdiction managed with a commercial glass/elver eel quota, if an overage occurs in a fishing year, that state or

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jurisdiction will be required to deduct their entire overage from their quota the following year, on a pound for pound basis.

- **Reporting Requirements:** Any state or jurisdiction with a commercial glass eel fishery is required to implement daily trip level reporting with daily electronic accounting to the state for both harvesters and dealers in order to ensure accurate reporting of commercial glass eel harvest. The state of Maine's swipe card system is used by the state as a dealer report. Harvesters in Maine are currently reporting monthly via paper report submission. States or jurisdictions commercially harvesting less than 750 pounds of glass eels are exempt from this requirement.
- **Monitoring Requirements:** Any state or jurisdiction with a commercial glass eel fishery must implement a fishery-independent life cycle survey covering glass/elver, yellow, and silver eels within at least one river system. If possible and appropriate, the survey should be implemented in the river system where the glass eel survey (as required under Addendum III) is being conducted to take advantage of the long term glass eel survey data collection. At a minimum the survey must collect the following information: fishery-independent index of abundance, age of entry into the fishery/survey, biomass and mortality of glass and yellow eels, sex composition, age structure, prevalence of *A. crassus* (invasive nematode), and average length and weight of eels in the fishery/survey. Survey proposals will be subject to Technical Committee (TC) review and Board approval. States or jurisdictions commercially harvesting less than 750 pounds of glass eels are exempt from this requirement.

Glass Eel Harvest Allowance Based on Stock Enhancement Programs: Any state or jurisdiction can request an allowance for commercial harvest of glass eels based on stock enhancement programs implemented after January 1, 2011, subject to TC review and Board approval. Provisions of the stock enhancement program include: demonstration that the program has a measurable increase in glass eel passage and/or survival; harvest shall not be restricted to the basin of restoration (i.e. harvest may occur at any approved location within the state or jurisdiction); and harvest requests shall not exceed 25% of the quantified contribution provided by the stock enhancement program. See Addendum IV for more detail on specific stock enhancement program examples.

Option 1: Status Quo Quota for Maine of 9,688 pounds of glass eel

Maine's glass eel quota for 2018 and beyond would remain at 9,688 pounds. This quota level was specified based on the state's landings in 2014 and has been in place since 2015. To change the quota in future years, a new addendum would be required. Noted in the fishery description section is an overview of Maine's implementation of the swipe card program to improve the accuracy of state landings. As part of the provisions of Addendum IV and the 2015-2017 quota, the state also developed a life cycle fishery-independent

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survey, aimed at getting more biological data on glass, yellow, and silver eel life stages within one river system. The state was unable to collect data in 2016 but continued developing the survey in 2017; results will be presented to the TC in 2018.

Option 2: 2014 Maine Quota

Maine's glass eel quota for 2018 and beyond would be set at 11,479 pounds. This quota level was specified for 2014 based on industry and tribal representatives and was a 35% reduction from 2012 landings. This quota is approximately a 19% increase from the 2015-2017 quota. Through the swipe card program, the state of Maine has made great efforts to curtail poaching of glass eels. The swipe card system coupled with individual fishing quotas ensures that that sale of an individual's eels are not comingled with poached eels. Maine also tracks dealer to dealer elver transactions as well as what is exported out of State by Maine licensed elver exporters. These transactions are compared to shipping invoices to ensure glass eels are not added to a shipment once it leaves Maine's jurisdiction. The Maine Marine Patrol has also been authorized to use as much overtime is needed to enforce all laws and regulations related to the glass eel fishery To adjust the quota in future years to higher level, a new addendum would be required.

3.2 Proposed Options of Glass Eel Aquaculture Plans

Due to the increased desire to bring eels to market, this addendum proposes a new option for allowing states and jurisdictions to pool harvest allocations for use in domestic aquaculture facilities.

Option 1: Status Quo

The Aquaculture Plan provisions as specified in Addendum IV would remain in place and pooling of harvest among states and jurisdictions for domestic aquacultures would not be allowed. For more information on the current aquaculture plan provisions please refer to Appendix I. Addendum IV Aquaculture Plan Provisions

Option 2: Pooling of Harvest allowance across states and jurisdictions

Under this option, up to **three contiguously bordered states** and jurisdictions would be allowed to pool their harvest of 200 pounds of glass eels up to a maximum of **600 pounds**. The 200 pounds allowable harvest would be harvested from each state within the pooled grouping of states and jurisdictions, unless the states and jurisdictions can make a strong argument to have all eels harvested from a single watershed system. As the pooling of harvest would be up to a maximum of 600 pounds, less than the 750 pounds that requires a life cycle survey, state and jurisdictions pooling harvest of glass eels for domestic aquaculture purposes would not need to implement a life cycle survey.

Additionally, it would be up to the states and jurisdictions to determine the number of aquaculture facilities per state. If under this option multiple facilities within a state or 'pooled' states are seeking glass eel harvest, it will be up to the states and jurisdictions to

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determine how the allowable harvest would be allocated among aquaculture facilities. States and jurisdictions would need to define harvest areas in their proposal to the Board.

This option would also seek to maintain all other Addendum IV Aquaculture Plan provisions (see Appendix I for more detail) with the exception of requiring states to objectively show that harvest would only occur from watersheds that minimally contribute to the spawning stock of American eel. If this option is selected, states would no longer need to objectively demonstrate harvest of glass eels for domestic aquaculture purposes would only come from watersheds that minimally contributes to the spawning stock of American eel.

3.3 Proposed Options for Yellow Eel Coastwide Cap, Trigger, and State-by-state Allocations

Issue 1: Coastwide Cap

The Addendum IV coastwide cap of 907,671 pounds, was set at the average landings during the years 1998 through 2010, which was the period covered by the 2012 Benchmark Assessment. Although the 2017 Assessment Update repeated the 2012 Benchmark Assessment finding that the American Eel population is depleted, the American eel Allocation Working Group notes the following reasons to consider increasing the cap:

- Yellow eel landings have fluctuated over a narrow range during the period of 1998 through 2016, suggesting an annual landings cap set at the mean landings level during this period is sustainable.
- Yellow eel catch is difficult to verify in the time frame specified by the Addendum IV triggers because most yellow eels are sold as live product. Yellow eels are held live by harvesters until sold, so yellow eels can be harvested in one year, but not weighed, sold and reported until the following year. Yellow eels also are often transported out of the state of landing and sold in another state, requiring two states to reconcile the landings information to avoid reporting duplication. These problems may result in the triggers appearing to be exceeded based on initial catch reports and states being required to implement quotas unnecessarily before reports are finalized. The yellow eel landings reporting timeliness problem is exemplified by the Addendum IV coastwide cap, now that the landings data used to calculate the Addendum IV cap have been updated for Addendum V. As noted below, the Addendum IV cap calculated using the updated Addendum V landings for the same 1998-2010 timeframe is 916,469 lbs., almost 10,000 lbs. greater than the Addendum IV cap.

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- Addendum IV allocated 88% of the yellow eel landings to the Delaware and Chesapeake Bay states in the event that state-by-state allocations were triggered. The yellow eel fishery in these states is conducted solely in estuarine waters. The yellow eel surveys conducted in Delaware and Chesapeake Bay states analyzed in the 2017 American Eel Assessment Update Report, either showed no trend or an increasing trend, suggesting the fishery is not diminishing the yellow eel abundance in this region. In addition, commercial fishery CPUE as reported in state compliance reports has not declined in this region.
- American eels reach maturity at a younger age and smaller size in estuarine water than in fresh water (Clark 2009), and the 19-year time series of landings likely represents at least two generations (COSEWIC 2012) of estuarine yellow eels that have been exposed to the yellow eel fishery. Given the American eel's panmictic life history, if the fishery were causing a population decline, that population decline should be evident in all areas of its range, especially the areas of maximum exploitation.

NOTE: For all coastwide landings cap options below, as this Addendum will alter management starting in 2019, the 2018 landings data will be used to evaluate against the selected option below. In turn, depending on the subsequent options selected under Section 3.3 Issue 2,3, and 4 the earliest potential state-by-state allocations or other management response would be implemented starting in 2020 (i.e. 2018 landings data available in 2019 would be evaluated in 2019 with management response in 2020).

Option 1: Status Quo

Under this option, the current coastwide cap of 907,671 pounds would remain in place as well as provisions of the coastwide cap as specified in Addendum IV. **Please note:** The coastwide cap was specified in Addendum IV based on available data through 2010. That data has been subsequently revised and new coastwide average from 1998-2010 is 916,473 pounds. If the Board wishes to specify a new coastwide cap of 916,473 pounds based on average landings from 1998-2010 that would be an additional option.

Option 2: Coastwide Landings Cap set at **943,808 pounds**; the 50th percentile or median of 1998-2016 landings

The yellow eel fishery is dependent on foreign market fluctuations, thus effort and landings can vary considerably between years regardless of the yellow eel population. The median (50th percentile) annual landings accounts for these variations by setting the coastwide landings cap at the mid-point in landings, which should reflect the midpoint in effort for the time series also.

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Option 3: Coastwide Landings Cap set at **951,102 pounds**; the mean or average of 1998-2016 landings

The Addendum IV coastwide catch cap will be set at the mean of 1998 through 2016 landings. The mean of 1998 through 2016 landings option updates the coastwide landings cap to include more recent landings data.

Issue 2: Management Trigger

For all three of the options listed under Issue 2, a management response would be required. The potential management response would be dependent on the selected option under Issue 3 'Allocation'. If a state-by-state commercial yellow eel quota option is selected, states would be required to implement a management program that would allow the state to constrain landings to the state's quota allocation starting in the subsequent year the management trigger is tripped. As this Addendum outlines management starting in 2019, the earliest year state by state quotas would be implemented is 2020 (either Option 1A- Coastwide Cap exceeded by 10% in a given year or Option 2- One-year Trigger).

Option 1: Status Quo

Under this option the current (two) management triggers as outlined in Addendum IV would remain in place regardless of whether the coastwide catch cap is adjusted in the prior subsection (Issue 1). If either of these management triggers are tripped, a management response would be required. The potential management response would be dependent on the selected option under Issue 3 'Allocation' (below).

Management Triggers

1. The coastwide catch cap is exceeded by more than 10% in a given year (the value of exceedance is dependent on the selected option in Issue 1: Coastwide Cap).
2. The coastwide catch cap is exceeded for two consecutive years, regardless of percent over.

Options 2 and 3 below would establish a management trigger that takes into account the inter-annual variability of the coastwide landings and incorporates years subsequent to 2010. From 2011 through 2016 coastwide landings have fluctuated from 31% above the Coastwide Cap to 4% below it, with five of the six years above the Coastwide Cap (Figure 1). Note that the Coastwide Cap is set at 907, 671 pounds; a 10% exceedance of the Coastwide Cap is 998,438 pounds.

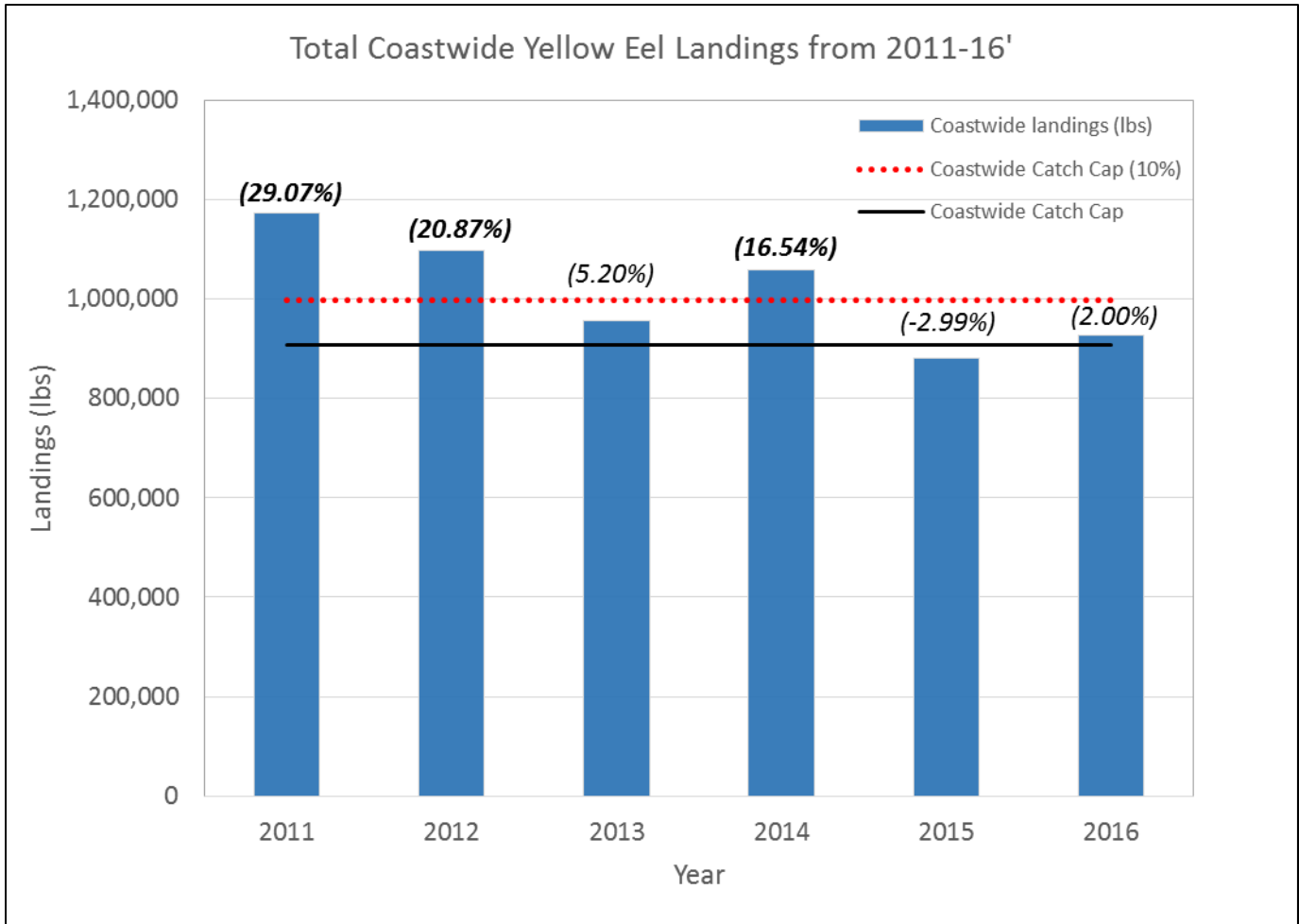


Figure 1. Coastwide yellow eel landings from 2011-2016 compared to Coastwide Cap and 10% exceedance of the Cap Management Trigger. Percentages above each bar indicate percent above (or below) the Coast-wide Catch Cap.

Option 2: One year of exceeding the Coastwide Cap by 10% (One year trigger)

Under this option, the coastwide landings would annually be evaluated against a new one year management trigger. If the coastwide catch cap is exceeded by 10% (the value of exceedance is dependent on the selected option in Issue 1: Coastwide Cap) the Board is required to alter the management program as specified below (Issue 3) in order to ensure the objectives of the management program are achieved.

Option 3: Two years of exceeding Coastwide Cap by 10% (Two year trigger)

Under this option, the coastwide landings would annually be evaluated against a new one year management trigger. If the coastwide catch cap is exceeded by 10% (the value of exceedance is dependent on the selected option in Issue 1: Coastwide Cap) the Board is required to alter the management program as specified below (Issue 3) in order to ensure the objectives of the management program are achieved.

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Issue 3: Allocation

If the selected management trigger in the above subsection (Issue 2) is tripped, then states would be required to take action for the subsequent fishing year. Under issue 3, the following outlines options for state-by-state allocations as well as options for no state allocation. If a state by state allocation option is selected, states must ensure that a quota management program is implemented to address quota overages and allow quota transfers, as specified below. It is recommended that monitoring and reporting requirements be sufficient to prevent repeated overages. Additionally, the following provisions would apply to any state-by-state quota allocation options below:

- State Quotas will be evaluated on a calendar year basis.
- Final Landings data from the previous year will be evaluated against a state's quota from the same year. Final landings data from the previous year will be made available for the current year by the ASMFC Spring Meeting (i.e. May).
- The Board will confirm overages and adjusted quotas (as needed) for the following year no later than the ASMFC Annual Meeting (i.e. October-November) of the current year.
- States will put forward proposals demonstrating the following year's quota will not be exceeded no later than the ASMFC Winter Meeting (i.e. January-February) of the following year.

Option 1: Status quo

Addendum IV laid out the following process for specifying the coastwide cap and state-by-state allocations. The initial quota was set at 2010 landings levels (978,004 pounds). 2010 represented the last year of data included in the 2012 benchmark stock assessment. The TC recommended to reduce mortality from this level. From this level a 16% reduction was applied to the 2010 landings levels (821,523 pounds). Then average landings for the states from 2011-2013 were used to developed initial allocations. From this point a filtering method was applied to adjust allocations: 1) states are allocated a minimum 2,000-pound quota 2) no state is allocated a quota that is more than 2,000 pounds above its 2010 commercial yellow eel landings, and 3) no state is allocated a quota that is more than 15% reduction from its 2010 commercial yellow eel landings. After the filtering method was applied, the coastwide quota was 893,909 pounds. The difference between updated quota and TC recommendation was 13,762 pounds. This difference was split equally among the states negatively impacted by the quota relative to 2010 commercial landings (RI, NJ, DE, PRFC, NC). For states that qualify for the 2,000-pound base quota, any overages would be deducted from the 2,000 pound allocation.

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Table 3. Quota Allocation for the Commercial Yellow Eel Fishery from Addendum IV. This quota would ONLY be implemented if the Board selected management trigger (Issue 2) is tripped.

	Allocation	Quota
Maine	0.43%	3,907
New Hampshire	0.22%	2,000
Massachusetts	0.22%	2,000
Rhode Island	0.51%	4,642
Connecticut	0.22%	2,000
New York	1.677%	15,220
New Jersey	10.45%	94,899
Delaware	6.79%	61,632
Maryland	51.33%	465,968
PRFC	5.76%	52,358
Virginia	8.67%	78,702
North Carolina	11.79%	107,054
South Carolina	0.22%	2,000
Georgia	0.22%	2,000
Florida	1.46%	13,287
Total	100%	907,669

Option 2: No state-by-state quota

Under this option, the yellow eel fishery would be managed without state-specific quotas through adaptive management. Should the management trigger be tripped the Board will engage the TC to determine the reduction necessary to return coast-wide landings to the cap in the subsequent fishing year and identify mechanisms that could achieve the desired reduction (e.g. trip limits, season closures, or other effort reductions). The reduction may be scaled among states to ensure equitable management. States will develop a plan to achieve assigned reductions and submit to the TC for review. The following sub-options specify how the states would work to achieve the required reduction.

Sub-Option 2A: Equitable reduction

Under this sub-option, all states would work collectively to achieve an equitable reduction in landings from the most recent year’s cumulative coastwide landings to the coastwide landings cap if the management trigger is tripped. For example, in 2019, if 2018 landings exceed the coastwide catch cap as specified in the prior section, then the states would collectively develop measures to achieve the needed reduction to achieve the coastwide catch cap in 2020 fishing year.

Sub-Option 2B: 1% rule for states to reduce landings

Under this sub-option, only states with landings greater than 1% of the coastwide landings in the year(s) when the management trigger is tripped will be responsible for reducing

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their landings to achieve the coastwide landings cap in the subsequent year. Those states with landings greater than 1% of the coastwide landings will work collectively to achieve an equitable reduction to coast wide landings cap. For those states with landings less than 1% of the coastwide landings category, if in subsequent years a state's landings exceeds 1% of the coastwide landings after reductions have been applied, that state must reduce their individual state landings in the subsequent year to return to the <1% level.

Option 3: Modified Addendum IV Quotas

This is a modification of the Addendum IV allocation formula intended to offer greater flexibility given the variability in landings over time.

This option maintains the basic allocation structure from Addendum IV, but makes some adjustments in order to more evenly distribute the impacts of a quota relative to recent (2012-2016) fishery performance, while maintaining the spirit of Addendum IV allocation. Under this option, states whose quota would have resulted in reductions from average harvest over the most recent 5 years still will need to reduce, but these reductions are mitigated.

Quota was redistributed among the states from two sources:

- 1) A cap on allocations so that a state's assigned quota cannot exceed their 2012-2016 average harvest by more than 25%.
- 2) The 2,000 pound minimum quota assigned to New Hampshire, Massachusetts, Connecticut, South Carolina, and Georgia was initially removed and redistributed back to the remaining states.

The quota resulting from the removal of the 2,000 pound minimum and from capping states with more than a 25% increase was used two ways: 1) to set Maine's harvest equal to their 2012-2016 harvest (5,952 pounds) and therefore mitigate Maine's reduction if a quota is implemented. 2) The remainder (52,918 pounds) was divided evenly among and added to the Addendum IV quotas of New York, Maryland and Virginia - the only three states who would face a reduction from 2012-2016 average harvest levels under Addendum IV.

Finally, based on harvest history, 0.75% of the coast wide cap (6,808 pounds under the current cap) was set aside and divided evenly among those 5 states given the minimum 2,000 pound allocation under Addendum IV ($6,808/5 = 1,362$ pounds). The allocation of 1,262 pound was rounded down to 1,000 pounds for each of the states. The excess from this rounding (1,807.5 pounds) was added back to Maryland's proposed quota to further mitigate their impacts (Table 4 and Figure 1).

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Table 4: An allocation option using Addendum IV allocation as a base but reallocating quota generated by lowering the minimum base allocation to an equal division of 0.75% of the cap and rounding down, and capping the assigned quota to no more than a 25% increase over the average harvest in 2012-2016. The final column shows how impacts of Addendum IV quotas relative to recent harvest are mitigated.

State	Average harvest 2012-2016 (pounds)	Addendum IV allocation in pounds	Percent change: average 2012-2016 harvest to Addendum IV quota	Addendum V option 3 quotas	Percent change: average 2012-2016 harvest to option 3 quota
Maine	5,952	3,907	-34.356	5,907	-0.7
New Hampshire		2,000		1,000	
Massachusetts	2,165	2,000		1,000	
Rhode Island	2,054	4,642	125.998	2,551	24.2
Connecticut	1,776	2,000		1,000	
New York	40,631	15,220	-62.541	32,613	-19.7
New Jersey	90,305	94,899	5.087	94,187	4.3
Delaware	57,790	61,632	6.649	61,170	5.8
Maryland	574,968	465,968	-18.958	481,788	-16
PRFC	52,286	52,358	0.137	51,965	-0.6
Virginia	102,914	78,702	-23.527	95,619	-7.1
North Carolina	51,309	107,054	108.644	63,818	24.4
South Carolina		2,000		1,000	
Georgia		2,000		1,000	
Florida	10,532	13,287	26.154	13,051	23.9
		907,669		907,669	

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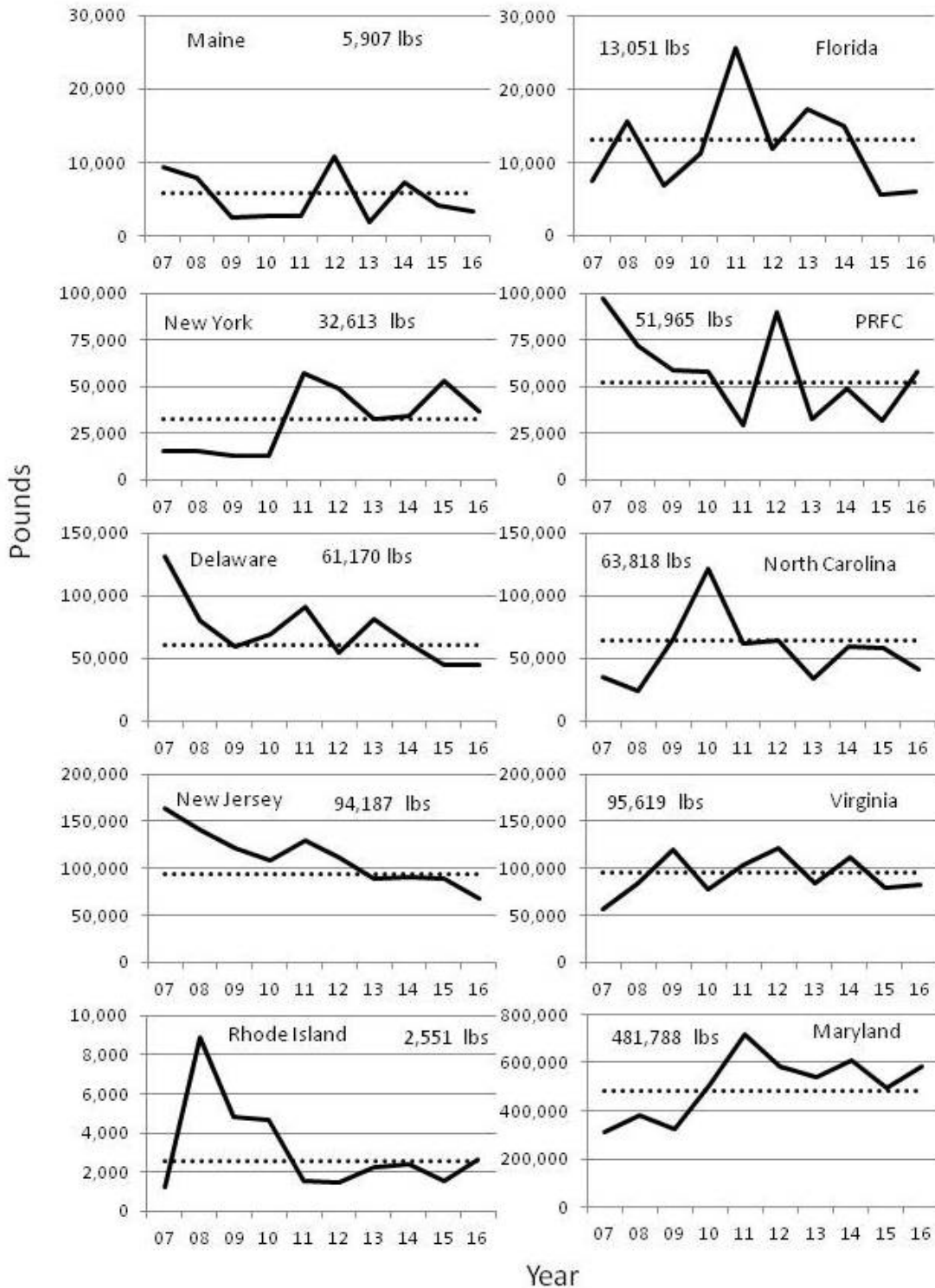


Figure 2. Potential Allocation Option. This shows proposed quotas (green line) compared to each state's landings over the past 10 years. State not shown are assigned a base quota of 1,500 pounds. The proposed quota assuming a status quo coastwide quota of 907,699 pounds.

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Note: for Options 4 and 5 the following items on accountability will be carried over from Addendum IV:

- *Accountability:* States will be held accountable for their annual quota. If a state or jurisdiction has an overage in a given fishing year, then the state or jurisdiction is required to reduce their following year's quota by the same amount the quota was exceeded, pound for pound. For states that qualify for the automatic 2,000 pound quota, any overages would be deducted from the 2,000 pound allocation.

Under both the catch cap and quota systems all New York American eel landings (i.e. from both the yellow and silver eel fisheries) are included, until otherwise shown to preclude it.

Additionally for the following example tables in Sub-Option A & B, a breakdown of previous allocation under Addendum IV state by state quotas is compared against new state allocations of the same coastwide cap.

Option 4: Simple Time series Average of Yellow eel landings

Under this option states will be allocated a quota based on the state's average yellow eel landings data for a specific timeframe. In the example allocations listed below, the coastwide landings quota is set at 907,669 pounds (the Addendum IV coastwide quota) to help compare current state by state quotas under Addendum IV to the proposed quotas in options 4 A and B. Data used to develop average landings for each time series can be found in Table 2. **NOTE:** The state by state allocations below would differ if either option 2 or 3 under issue item 1 (Coastwide Cap) are selected. Additionally, please note that due to low landings and data confidentiality, New Hampshire, South Carolina, and Georgia's average landings for the two time periods are not specified below.

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Sub Option 4A: Average Landings over recent 10-year time series (2007-2016)

State	Average Landings 2007-2016	New Percentage Allocation under Option 4A	Addendum IV Quota	New Quota under Option 4A
ME	5,545	0.57%	3,907	5,217
NH		0.01%	2,000	61
MA	1,888	0.20%	2,000	1,776
RI	3,112	0.32%	4,642	2,928
CT	1,652	0.17%	2,000	1,555
NY	29,437	3.05%	15,220	27,696
NJ	110,331	11.44%	94,899	103,808
DE	72,975	7.56%	61,632	68,661
MD	517,548	53.65%	465,968	486,947
PRFC	57,608	5.97%	52,358	54,201
VA	95,357	9.88%	78,702	89,719
NC	56,786	5.89%	107,054	53,429
SC		0.00%	2,000	3
GA		0.05%	2,000	436
FL	11,938	1.24%	13,287	11,232
Total	964,709	100%	907,669	907,669

Sub Option 4B: Average Landings over recent 5-year time series (2012-2016)

State	Average Landings 2012-2016	New Percentage Allocation under Option 4B	Addendum IV Quota	New Quota under Option 4B
ME	5,952	0.60%	3,907	5,438
NH		0.01%	2,000	50
MA	2,165	0.22%	2,000	1,978
RI	2,054	0.21%	4,642	1,877
CT	1,776	0.18%	2,000	1,623
NY	40,631	4.09%	15,220	37,122
NJ	90,305	9.09%	94,899	82,506
DE	57,790	5.82%	61,632	52,799
MD	574,968	57.87%	465,968	525,313
PRFC	52,286	5.26%	52,358	47,771
VA	102,914	10.36%	78,702	94,027
NC	51,309	5.16%	107,054	46,878
SC		0.00%	2,000	1
GA		0.07%	2,000	665
FL	10,532	1.06%	13,287	9,623
Total	993,466	100%	907,669	907,669

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Option 5: Allocation Based on Weighted Time series Average of Yellow eel landings

Under this option states will be allocated a quota based on weighted average of a state's yellow eel landings data for a specific timeframe. For the example allocations listed below, the coastwide landings quota is set at 907,669 pounds (the Addendum IV coastwide quota) to help compare current state by state quotas under Addendum IV to the proposed quotas in options 5 A and B. Data used to develop weighted average landings for each time series can be found in Table 2. **NOTE:** The state by state allocations in the tables below will differ if either option 2 or 3 under issue item 1 (Coastwide Cap) are selected. Also included for the following sub options is an example equation demonstrating how the allocation was derived (Appendix II).

Sub Option 5A: Weighted average: 50 % of the time series (1998-2016) and 50% of the recent 10 years (2007-2016) (pg 25)

Sub Option 5B: Weighted average: 50 % of the time series (1998-2016) and 50% of the recent 5 years (2012-2016) (pg 26)

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Sub Option 5A: Weighted average: 50 % of the time series (1998-2016) and 50% of the recent 10 years (2007-2016)

State	Addendum IV Percentage Allocation	Addendum IV Quota	New Percentage Allocation under Option 5A	New Quota under Option 5A
ME	0.430%	3,907	0.745%	6,759
NH	0.220%	2,000	0.009%	79
MA	0.220%	2,000	0.243%	2,209
RI	0.511%	4,642	0.540%	4,899
CT	0.220%	2,000	0.222%	2,017
NY	1.677%	15,220	2.707%	24,570
NJ	10.455%	94,899	11.209%	101,743
DE	6.790%	61,632	8.915%	80,920
MD	51.337%	465,968	48.673%	441,788
PRFC	5.768%	52,358	8.298%	75,319
VA	8.671%	78,702	10.315%	93,624
NC	11.794%	107,054	6.911%	62,731
SC	0.220%	2,000	0.000%	2
GA	0.220%	2,000	0.041%	376
FL	1.464%	13,287	1.171%	10,632
Coastwide	100.000%	907,669	100.000%	907,669

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Sub Option 5B: Weighted average: 50 % of the time series (1998-2016) and 50% of the recent 5 years (2012-2016)

State	Addendum IV Percentage Allocation	Addendum IV Quota	New Percentage Allocation under Option 5A	New Quota under Option 5B
ME	0.430%	3,907	0.755%	6,849
NH	0.220%	2,000	0.008%	73
MA	0.220%	2,000	0.254%	2,305
RI	0.511%	4,642	0.477%	4,333
CT	0.220%	2,000	0.225%	2,045
NY	1.677%	15,220	3.243%	29,432
NJ	10.455%	94,899	10.014%	90,891
DE	6.790%	61,632	8.002%	72,636
MD	51.337%	465,968	50.906%	462,057
PRFC	5.768%	52,358	7.902%	71,721
VA	8.671%	78,702	10.551%	95,767
NC	11.794%	107,054	6.527%	59,247
SC	0.220%	2,000	0.000%	1
GA	0.220%	2,000	0.054%	493
FL	1.464%	13,287	1.082%	9,819
Coastwide	100.000%	907,669	100.000%	907,669

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Issue 4: Quota Transfers

As noted in earlier sections, the Allocation Working Group highlighted concerns regarding the timing of when landings information becomes available and finalized, specifically in evaluating fishery performance. Addendum IV outlined the following provisions for the transfer of quota under state by state allocations:

- Any state or jurisdiction may request approval from the Board Chair or Commission Chair to transfer all or part of its annual quota to one or more states, including states that receive the automatic 2,000 pound quota. Requests for transfers must be made by individual or joint letters signed by the principal state official with marine fishery management authority for each state involved. The Chair will notify the requesting states within ten working days of the disposition of the request. In evaluating the request, the Chair will consider: if the transfer would preclude the overall annual quota from being achieved, the transfer addresses an unforeseen variation or contingency in the fishery, and if the transfer is consistent with the objects of the FMP. Transfer requests for the current fishing year must be submitted by December 31 of that fishing year.
- The transfer of quota would be valid for only the calendar year in which the request is made. These transfers do not permanently affect the state-specific shares of the quota, i.e., the states specific shares remain fixed. Once quota has been transferred to a state, the state receiving quota becomes responsible for any overages of transferred quota.

Many states are concerned that the implementation of state quotas will lead to fishery inefficiencies both at the state and coast-wide level. For example, late fall is often a peak yellow eel harvest period. If a state with unused quota was hesitant to transfer quota to a state that had filled its quota because it was unsure whether it could spare the unused quota, the quota in the potential donor state could go unused while the harvesters in the potential recipient state would be denied extra income. This inefficient use of the fishery and capricious reduction in fishery revenue is in direct contradiction of the ISFMP Charter. To avoid this potential problem, if a state by state allocation option is selected under Issue 3, the Allocation Working has put forward the following options:

Option 1: Status Quo (Transfers allowed no later than December 31)

Under this option, quota transfer requests must be submitted by December 31 of that fishing year.

Option 2: Extend transfer provisions to April 1 of the following fishing season.

Under this option transfers of quota between states be allowed until April 1 of the following calendar year. This strategy will allow both the donor and recipient state to have additional time to reconcile their landings data.

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3.4 Timeframe for Addendum provisions

There is not a sunset for this Addendum. If a new or different management program is desired than what is specified in the prior sections, a new addendum is required. If state by state allocations are implemented based on a selected management trigger and coastwide catch cap specified above, state by state allocations will be revisited within 3 years (reviewed in 2021). During the revisiting process, the Board may reconsider if state by state by state quotas are needed for the 2022 fishing season if the following criteria are met:

- The implemented state by state quotas have not been exceeded for 2 years.

Specific to the Maine glass eel quota, the selected quota in the section above will be specified for 3 years moving forward (starting in the 2019; from 2019-2021), and that before year 4 (2022) it could be revisited. If the Board decides to maintain Maine's glass eel quota at its specified level in the section above, the quota be extended for an additional 3 years (2022-2024) without requiring a new addendum. If there is a desire to increase Maine's glass eel quota from the specified level in the section above, a new Addendum will be required.

4.0 Compliance

TBD

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References

- Atlantic States Marine Fisheries Commission (ASMFC). 2000. Interstate Fishery Management Plan for American Eel (*Anguilla rostrata*). Washington D.C. NOAA Oceanic and Atmospheric Administration Award No. NA97 FGO 0034 and NA07 FGO 024.
- Atlantic States Marine Fisheries Commission (ASMFC). 2012. American Eel Benchmark Stock Assessment. Arlington, VA.
- Atlantic States Marine Fisheries Commission (ASMFC). 2014. Addendum IV to the Interstate Management Plan for American Eel. Arlington, VA.
- Atlantic States Marine Fisheries Commission (ASMFC). 2017. American Eel Stock Assessment Update. Arlington, VA.
- Blake, L. M. 1982. Commercial fishing for eel in New York State. In K. H. Loftus (ed). Proceedings of the 1980 North American eel conference. Ont. Fish. Tech. Rep. Ser. No. 4. 97pp
- Clark, J. 2009. The American Eel Fishery in Delaware. Pages 229-240 in J. M. Casselman and D. K. Cairns, editors. Eels at the edge: science, status and conservation concerns. American Fisheries Society Symposium 58, Bethesda, Maryland.
- COSEWIC. 2012. COSEWIC assessment and status report on the American Eel *Anguilla rostrata* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xii + 109 pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm).
- Helfman, G.S., D.L. Stoneburner, E.L. Bozeman, P.A. Christian, and R. Whalen. 1983. Ultrasonic telemetry of American eel movements in a tidal creek. Transactions of the American Fisheries Society 112:105–110.

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Appendix I. Addendum IV (2014) Aquaculture Plan Provisions

States and jurisdictions may develop a Plan for aquaculture purposes. Under an approved Aquaculture Plan, states and jurisdictions may harvest a maximum of 200 pounds of glass eel annually from within their waters for use in domestic aquaculture facilities provided the state can objectively show the harvest will occur from a watershed that minimally contributes to the spawning stock of American eel. The request shall include: pounds requested; location, method, and dates of harvest; duration of requested harvest; prior approval of any applicable permits; description of the facility, including the capacity of the facility the glass eels will be held, and husbandry methods; description of the markets the eels will be distributed to; monitoring program to ensure harvest is not exceeded; and adequate enforcement capabilities penalties for violations. Approval of a request does not guarantee approval of a request in future years. Eels harvested under an approved Aquaculture Plan may not be sold until they reach the legal size in the jurisdiction of operations, unless otherwise specified.

All Plans are subject to TC and LEC review and Board approval. The Fishing Mortality Based Plan must be submitted by June 1st of the preceding fishing year in order to provide enough time for review for the upcoming fishing season. Transfer and Aquaculture Plans must be submitted by June 1st of the preceding fishing year and approval will be determined by the Board by September 1st. Plans will initially be valid for only one year. After the first year of implementation the TC will evaluate the program and provide recommendations to the Board on the overall impact of and adherence to the plan. If the proposed regulatory changes, habitat improvements, or harvest impact cannot be assessed one year post-implementation, then a secondary review must occur within three to five years post-implementation if the action is still ongoing. If states use habitat improvements and changes to that habitat occurs in subsequent years, the Commission must be notified through the annual compliance report and a review of the Plan may be initiated. Any requests that include a stocking provision would have to ensure stocked eels were certified disease free according to standards developed by the TC and approved by the Board.

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Appendix II. Calculations for Option #5 Sub Options

The following calculations are done using North Carolina landings data from Table 2 as an example for Option 5 A: *Weighted average: 50 % of the time series (1998-2016) and 50% of the recent 10 years (2007-2016)*. Note that the same process is applied to Option 5B with a 5 year time series (2012-2016).

Step 1. Weighting Time Series Average Landings

A state's weighted time series average landings is calculated by multiplying the specified time series average by the weighting percentage (50% or 0.5) and the two time series average landings are then summed together through the following equation:

$$0.5 \times 19 \text{ year Time Series Average (1998-2016)} + 0.5 \times 10 \text{ year Time Series Average (2007-2016)} \\ = \\ \text{Weighting Time Series Average Landings}$$

$$0.5 \times \text{NC 19 yr Time Series Avg (75,621 pounds)} + 0.5 \times \text{NC 10 yr Time Series Avg (56,786 pounds)} \\ = \\ \text{North Carolina Weighted Time Series Average Landings is } \mathbf{66,203 \text{ pounds}}$$

Step 2. Solving for New Allocation Percentage

The state's new weighted time series average landings is then divided by the weighted total coastwide average landings to derive a state's new allocation percentage through the following equation:

$$\text{State Weighted Time Series Average Landings} / \text{Coastwide Weighted Time Series Average Landings} \\ = \\ \text{Allocation Percentage}$$

$$\text{North Carolina Weighted Avg (66,203 pounds)} / \text{Coastwide Weighted Avg (957,905 pounds)} \\ = \\ \text{North Carolina's Allocation Percentage is } \mathbf{6.911\%}$$

Step 3. Solving for New State Allocation in pounds

The state's new allocation percentage is then multiplied by the coastwide quota of 907,669 pounds (Addendum IV total coastwide quota) to derive the state's allocation in pounds through the following equation:

$$\text{State Allocation Percentage} \times \text{Addendum IV Total Coastwide Quota} = \text{New State Allocation}$$

$$\text{NC Allocation Percentage (6.911\%)} \times \text{Total Coastwide Quota (907,669 pounds)} \\ = \\ \text{North Carolina's new allocation for Option 5A under a coastwide Quota of 907, 669 pounds is } \mathbf{62,731 \text{ pounds}}$$



Atlantic States Marine Fisheries Commission

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MEMORANDUM

January 29, 2017

To: American eel Management Board
From: American eel Stock Assessment Subcommittee
RE: Questions regarding draft Addendum V (Revised memo)

Attendees: Matt Cieri (ME), Brad Chase (MA), Greg Hinks (NJ), Jeff Brust (NJ; SAS Chair), Keith Whiteford (MD), Laura Lee (NC), Troy Tuckey (VA), Sheila Eyler (USFWS)

Staff: Kirby Rootes-Murdy (ASMFC), Kristen Anstead (ASMFC), Heather Konell (ACCSP)

The Commission's American eel Stock Assessment Subcommittee (SAS) met via conference call on Wednesday January 24, 2018 to discuss questions posed by the American eel Allocation Working Group. The following questions were posed during the development of Draft Addendum V:

1. Provide feedback on the accuracy of the following statement:
American eels reach maturity at a younger age and smaller size in estuarine water than in fresh water (Clark 2009), and the 19-year time series of landings likely represents at least two generations (COSEWIC 2012) of estuarine yellow eels that have been exposed to the yellow eel fishery. Given the American eel's panmictic life history, if the fishery were causing a population decline, that population decline should be evident in all areas of its range, especially the areas of maximum exploitation.
2. In considering new proposed Coastwide Landings Cap above the status quo, what are the implications for the stock if the coastwide cap is set a different (higher) level than its current level of 907,671 pounds?
3. In considering changes to the current Management Triggers, what is the impact to the resource if the current coastwide cap is exceeded by two current management triggers (1. 10% overage= harvest at or above 998,438 pounds in one year; 2. Any overage of 907,671 pounds for two consecutive years)?
4. What type of guidance can the SAS/Technical Committee provide the Board in addressing overages of the Coastwide Cap?

Lastly, the group was also updated on the additional proposed management option related to allowance of pooling harvest for glass eels (up to 600 pounds) to use for domestic aquaculture by up to three contiguously bordered states and removal of the provision requiring states to objectively show that harvest would only occur from watersheds that minimally contribute to the spawning stock of American eel. The SAS's response to each of these items is below in corresponding order.

- 1. In considering the statement that ‘...Given the American eel’s panmictic life history, if the fishery were causing a population decline, that population decline should be evident in all areas of its range, especially the areas of maximum exploitation ’**

The SAS members were in agreement that the statement is incorrect. The SAS members noted that stocks decline from the edges inward with continued high harvest in the center of the population although populations may be declining at the edges of the species range. In fact, hyperstability - when catch rates are high but in fact the stock is being depleted (e.g. North Atlantic cod)- is a challenging issue for data-poor species such as American eel. The provided statement also does not consider how sex ratios and maturation varies latitudinally, which may be important for population persistence. The population also includes areas outside the U.S. and ASMFC jurisdiction, so the current ASMFC stock assessment is not necessarily indicative of population trends. The assessment also only tracks the trends in the estuary and not the freshwater areas (which are not sampled adequately). The stock is only “stable” in our fishing areas, although it is stable at historic lows, and our assessment says that the stock is depleted. The current “no trend” in many surveys does not mean there is not information on those stocks, it just means that stocks are not increasing or decreasing and that should not be used as a justification for increasing quota.

The SAS recommended that the Technical Committee review the draft Addendum V before it is released for public comment in order to review for accuracy of statements and provide feedback.

- 2. In considering new proposed Coastwide Landings Cap above the status quo, what are the implications for the stock if the coastwide cap is set a different (higher) level than its current level of 907,671 pounds?**

The SAS highlighted that none of the proposed options listed under issue 1 in Section 3.3 are a 12% reduction from the time series average as was suggested by Technical Committee in 2014 prior to the approval of Addendum IV. At the time, the TC noted that based on the 2012 Benchmark Stock Assessment- that called for reducing mortality across all life stages due to the depleted status- 12% reduction from the baseline period of 1998-2010 (equal to approximately 798,751 pounds) was deemed as an acceptable precautionary approach for the implementation of a coastwide quota. The Board opted instead to set the coastwide cap at the baseline level of 907,671 pounds.

As the 2012 and 2017 Stock Assessment did not have an accepted peer reviewed analytical model to develop biological reference points, the SAS is not able to run projections to answer this question (i.e. stock status at different removal levels). However, harvest has remained relatively stable over time period of 1998-2016. This suggests that current harvest (mean or average of recent landings) will not allow for stock rebuilding, and it may not even guarantee that the stock will stay stable if reductions are not taken.

3. In considering changes to the current Management Triggers, what is the impact to the resource if the current coastwide cap is exceeded by two current management triggers (1. 10% overage= harvest at or above 998,438 pounds in one year; 2. Any overage of 907,671 pounds for two consecutive years)?

The SAS highlighted that the current stock assessment is not rigorous enough to answer that question, but given our current depleted status exceeding the Coastwide Cap by any meaningful amount will hamper rebuilding and reduce the stocks ability to expand. The SAS has never been given direction by the Board on what condition of the stock they would like to manage to and if they would like to maintain current status or try to rebuild and their accepted level of risk. If rebuilding is desired, the increased coastwide cap is likely not going to achieve that goal. However, it would be difficult for the SAS to recommend harvest levels without reference points for the fishery.

The SAS wishes to communicate the following overarching statement to the Board: Stock status has not changed from last update but American eel in the ASMFC managed range is at historically low levels. Any liberalization of the Coastwide Cap will not promote rebuilding, and may lead to a population decline. The SAS is seeking a more clear management goals (rebuilding or maintaining current biomass) to better assess the questions being posed.

4. What type of guidance can the SAS/Technical Committee provide the Board in addressing overages of the Coastwide Cap?

The SAS members were in agreement on the call that this is an allocation issue and not a biological or population issue that the SAS can address. Decision on this issue may relate to rebuilding targets if the Board intends to rebuild the stock. Other options for harvest reduction could be completed by effort reduction (season, bag/possession limits, etc.), but the SAS does not have a firm recommendation.

The SAS also reviewed the proposed changes to the aquaculture plan included in the draft addendum. While the proposal to allow contiguous states to pool the allocated 200 pounds of glass eel does not in fact increase the coastwide allowable allocation for aquaculture, it does increase access and may increase elver harvest. States that may not have the infrastructure to implement an aquaculture plan under the current strategy may now share their 200 pounds with a state that does, thereby increasing the current glass eel catch. The SAS recognized that this may not affect the overall population of American eel, but increasing the amount of harvest without any additional data requirements continues to inhibit the progress of the current stock assessment and the ability of the SAS to answer Board questions about this stock more quantitatively. With the depleted status, harvesting more American eel at any life stage is not going to improve the stock and may be detrimental.

2017 REVIEW OF THE
ATLANTIC STATES MARINE FISHERIES COMMISSION
FISHERY MANAGEMENT PLAN FOR
AMERICAN EEL
(Anguilla rostrata)

2016 FISHING YEAR



Prepared by the American Eel Plan Review Team
January 2018

**2017 REVIEW OF THE ASMFC FISHERY MANAGEMENT PLAN FOR
AMERICAN EEL
(*Anguilla rostrata*)**

I. Status of the Fishery Management Plan

<u>Date of FMP approval:</u>	November 1999
<u>Addenda:</u>	Addendum I (February 2006) Addendum II (October 2008) Addendum III (August 2013) Addendum IV (October 2014)
<u>Management unit:</u>	Migratory stocks of American Eel from Maine through Florida
<u>States with a declared interest:</u>	Maine through Florida, including the District of Columbia and the Potomac River Fisheries Commission
<u>Active committees:</u>	American Eel Management Board, Plan Review Team, Technical Committee, Stock Assessment Subcommittee, and Advisory Panel

The ASMFC American Eel Management Board first convened in November 1995 and finalized the Fishery Management Plan (FMP) for American Eel in November 1999 (ASMFC 2000). The goal of the FMP is to conserve and protect the American eel resource to ensure ecological stability while providing for sustainable fisheries. In support of this goal, the following objectives are included:

The FMP requires all states and jurisdictions to implement an annual young-of-year (YOY) abundance survey to monitor annual recruitment of each year's cohort. In addition, the FMP requires a minimum recreational size, a possession limit and a state license for recreational fishermen to sell eels. The FMP requires that states and jurisdictions maintain existing or more conservative American eel commercial fishery regulations for all life stages, including minimum size limits. Each state is responsible for implementing management measures within its jurisdiction to ensure the sustainability of its American eel population.

In August 2005, the American Eel Management Board directed the American Eel Plan Development Team (PDT) to initiate an addendum to establish a mandatory catch and effort monitoring program for American eel. The Board approved Addendum I at the February 2006 Board meeting.

In January 2007, the Management Board initiated a draft addendum with the goal of increasing escapement of silver eels to spawning grounds. In October 2008, the Management Board approved Addendum II, which placed increased emphasis on improving the upstream and downstream passage of American eel. The Management Board chose to delay action on management measures in order to incorporate the results of the 2012 stock assessment.

In August 2012, the Management Board initiated Draft Addendum III with the goal of reducing mortality on all life stages of American eel. The Addendum was initiated in response to the findings of the 2012 Benchmark Stock Assessment, which declared American eel stock along the US East Coast depleted. The Management Board approved Addendum III in August 2013.

Addendum III requires states to reduce the yellow eel recreational possession limit to 25 eel/person/day, with the option to allow an exception of 50 eel/person/day for party/charter employees for bait purposes. The recreational and commercial size limit increased to a minimum of 9". Eel pots are required to be ½" by ½" minimum mesh size or have at least a 4" by 4" escape panel of ½" by ½" mesh escape panel. The glass eel fishery is required to implement a maximum tolerance of 25 pigmented eels per pound of glass eel catch. The silver eel fishery is prohibited to take eels from September 1st to December 31st from any gear type other than baited traps/pots or spears. The Addendum also set minimum monitoring standards for states and required dealer and harvester reporting in the commercial fishery.

In October 2014, the Board approved Addendum IV. This addendum was also initiated in response to the 2012 American Eel Benchmark Stock Assessment and the need to reduce mortality on all life stages. The Addendum established a coastwide cap of 907,671 pounds of yellow eel, reduced Maine's glass eel quota to 9,688 pounds (2014 landings), and allowed for the continuation of New York's silver eel weir fishery in the Delaware River. For yellow eel fisheries, the coastwide cap was implemented for the 2015 fishing year and established two management triggers: (1) if the cap is exceeded by more than 10% in a given year, or (2) the cap is exceeded for two consecutive years regardless of the percent overage. If either one of the triggers are met, then states would implement state-specific allocation based on average landings from 2011-2013. The addendum also requires any state or jurisdiction with a commercial glass eel fishery to implement a fishery independent life cycle survey covering glass, yellow, and silver eels within at least one river system.

In October 2017, the Board initiated draft Addendum V. The draft Addendum will explore new management options for provisions included in Addendum IV, specifically the coastwide cap, the management triggers, and state by state allocations for the yellow eel fishery as well as Maine's glass eel quota. The Board will take final action on the document in 2018.

II. Status of the Stock

In 2009, the Management Board initiated a benchmark stock assessment. After reviewing over 100 surveys and studies, the American Eel Stock Assessment Subcommittee (SAS) selected 19 YOY surveys and 15 yellow eel surveys along the East Coast for use as indices of abundance in the assessment. Despite the large number of surveys and studies available for use, the American eel stock is still considered data-poor because very few surveys target eels and collect information on length, age, and sex of the animals caught. Additionally, eels have an extremely complex life history that is difficult to describe using traditional stock assessment models. Therefore, several data-poor methods were used to assess the American eel resource.

The first set of analyses (trend analyses) aimed to determine if there was a statistically significant trend in the fishery-independent survey data and whether or not there was evidence for significant trends on the regional and coastwide scales. The second approach involved a Depletion-Based Stock Reduction Analysis (DB-SRA) model, which uses trends in historical catch to estimate biomass trends and maximum sustainable yield. Both the trend analyses and DB-SRA results indicated that the American eel stock declined in recent decades, and the prevalence of significant downward trends in multiple surveys across the coast is cause for concern. Therefore, the stock status for American eels is depleted, although overfishing and overfished status in relation to the reference points could not be determined with confidence. The benchmark stock assessment was peer reviewed in March 2012 and was approved for management use in May 2012 (ASMFC 2012).

In 2003, declarations from the International Eel Symposium (AFS 2003, Quebec City, Quebec, Canada) and the Great Lakes Fisheries Commission (GLFC) highlighted concerns regarding the health of eel stocks worldwide. In 2010, the Canada Department of Fisheries and Oceans (DFO) conducted a stock assessment on American eels in Canadian waters and found that region-specific status indices show that abundance is very low in comparison to levels in the 1980s for the Lake Ontario and upper St. Lawrence River stock, and is either unchanged or increasing in the Atlantic Provinces.

The 2017 American Eel Stock Assessment Update updates the 2012 American Eel Benchmark Stock Assessment with data from 2010-2016. The trend analysis results in this stock assessment update are consistent with the 2012 results, with few exceptions. Despite downward trends in the indices, commercial yellow American eel landings have been stable in recent decades along the Atlantic coast (U.S. and Canada), although landings still remain much lower than historical landings. The trend analysis and stable low landings support the Assessment Update's conclusion that the American eel population in the assessment range is similar to five years ago and remains depleted. Therefore, the resource is considered depleted and no stock status specific to overfishing determination can be made based on the trend analyses performed (ASMFC 2017).

III. Status of the Fishery

American eel currently support commercial fisheries throughout their range in North America, with significant fisheries occurring in the US Mid-Atlantic region and Canada. These fisheries are executed in riverine, estuarine, and ocean waters. In the US, commercial fisheries for glass eel/elvers exist in Maine and South Carolina and a silver eel weir fishery exists in New York's Delaware River, whereas yellow eel fisheries exist in all states and jurisdictions with the exception of Pennsylvania and the District of Columbia.

Although eel have been continuously harvested, consistent data on harvest are often not available. Harvest data from the Atlantic coastal states (Maine to Florida) indicate that the harvest fluctuated widely between 1970 and 1980, but showed an increasing trend that peaked

in 1979 at 3,951,936 pounds. Harvest has declined since then, with the lowest harvest of 641,225 pounds occurring in 2002. Because fishing effort data are unavailable for the entire time series, finding a correlation between population numbers and landings data is difficult.

Commercial

Please Note: Landings information for the following section are from state compliance reports. The states are working with ACCSP to provide updated and correct landings information; as such, some of the information below may not reflect updated landings information.

Commercial landings have decreased from a high of 3.95 million pounds in 1979 to a low of 641,000 pounds in 2002, and have only recently begun to exceed one million pounds. State reported landings of yellow/silver eels in 2016 totaled 937,346 pounds¹ (Table 1), which represents an 8.4% increase in landings from 2015 (865,070 pounds). Yellow eel landings increased in seven states and jurisdictions, while decreasing in six others. In 2016, state reported landings from Maryland and Virginia together accounted for 72% of the coastwide commercial total landings. Landings of glass eels were reported from Maine and South Carolina, totaling 9,399.61 pounds.

Table 1. 2016 Commercial Landings by State and Life Stage¹

	State Reported	
	Glass	Yellow
Maine	9,399.61	4166
New Hampshire	No Fishery	0
Massachusetts	No Fishery	1,705
Rhode Island	No Fishery	2,651
Connecticut	No Fishery	266
New York	No Fishery	36,371
New Jersey	No Fishery	67,422
Pennsylvania	No Fishery	No Fishery
Delaware	No Fishery	44,398
Maryland	No Fishery	583,578
D.C.	No Fishery	No Fishery
PRFC	No Fishery	58,223
Virginia	No Fishery	96,336
North Carolina	No Fishery	39,911
South Carolina	Confidential (<750 pounds)	0
Georgia	No Fishery	Confidential

¹ Harvest data for 2016 comes from the 2017 State Compliance Reports.

Florida	Glass: 0 Elver: 0	6,034
Total	Glass: 9,399.61 Elver: 0	937,346

Table 2. State commercial regulations for the 2016 fishing year.*

State	Min Size Limit	License/Permit	Other
ME	Glass No minimum size	Daily dealer reports/swipe card program; monthly harvester report of daily landings. Tribal permit system in place for some Native American groups.	The harvester license lottery was previously suspended by the Legislature for improvements, but will be reinstated for 2018 fishing season.
	Yellow 9"	Harvester/dealer license and monthly reporting. Tribal permit system in place for some Native American groups.	Seasonal closures. Gear restrictions. Weekly closures.
NH	9"	Commercial saltwater license and wholesaler license. No dealer reports. Monthly harvester reporting includes dealer information.	Gear restrictions in freshwater.
MA	9"	Commercial permit with annual catch report requirement. Registration for dealers with purchase record requirement. Dealer/harvester reporting.	Traps, pots, spears, and angling only. Mesh restrictions.
RI	9"	Commercial fishing license. Dealer/harvester reporting.	Seasonal gear restrictions.
CT	9"	Commercial license (not required for personal use). Dealer/harvester reporting.	Gear restrictions.
NY	9"	Harvester/dealer license and monthly reporting.	Gear restrictions. Maximum limit of 14" in some rivers.

State	Min Size Limit	License/Permit	Other
NJ	9"	License required. No dealer reports. Monthly harvester reporting includes dealer information.	Gear restrictions.
PA	NO COMMERCIAL FISHERY		
DE	9"	Harvester reporting, no dealer reporting. License required.	Commercial fishing in tidal waters only. Gear restrictions.
MD	9"	Dealer/harvester license and monthly reporting.	Prohibited in non-tidal waters. Gear restrictions. Commercial crabbers may fish 50 pots per day, must submit catch reports.
DC	NO COMMERCIAL FISHERY		
PRFC	9"	Harvester license and reporting. No dealer reporting.	Seasonal gear restrictions. Mesh size restrictions on eel pots.
VA	9"	Harvester license required. Dealer/harvester monthly reporting.	Mesh size restrictions on eel pots. Seasonal closures.
NC	9"	Standard Commercial Fishing License for all commercial fishing. Dealer/harvester monthly combined reports on trip ticket.	Mesh size restrictions on eel pots. Seasonal closures.
SC	Glass No minimum size	Fyke and dip net only permitted. Dealer/harvester monthly combined reports on trip ticket. License required.	Max 10 individuals. Gear and area restrictions.
	Yellow 9"	Pots and traps permitted only. Dealer/harvester monthly combined reports on trip ticket. License required.	Gear restrictions.
GA	9"	Personal commercial fishing license and commercial fishing boat license. Dealer/harvester monthly combined reports on trip ticket.	Gear restrictions on traps and pots. Area restrictions.
FL	9"	Permits and licenses. Harvester reporting. No dealer reporting.	Gear restrictions.

* For specifics on licenses, gear restrictions, and area restrictions, please contact the individual state.

Recreational

Available information indicates that few recreational anglers directly target American eel. For the most part, hook-and-line fishermen catch eel incidentally when fishing for other species. American eel are often purchased by recreational fishermen for use as bait for larger gamefish such as striped bass, and some recreational fishermen may catch their own to use as bait.

The National Marine Fisheries Service (NMFS) Marine Recreational Information Program (MRIP, formerly the Marine Recreational Fisheries Statistics Survey) shows a declining trend in the catch of eel during the latter part of the 1990s. As of 2009, recreational data are no longer provided for American eel, due to the unreliable design of MRIP that focuses on active fishing sites along coastal and estuarine areas.

Table 3. State recreational regulations for the 2016 fishing year.*

State	Size Limit	Possession Limit	Other
ME	9"	25 eels/person/day	Gear restrictions. License requirement and seasonal closures (inland waters only). Bait limit of 50 eels/day for party/charter boat captain and crew.
NH	9"	25 eels/person/day	Coastal harvest permit needed if taking eels other than by angling. Gear restrictions in freshwater.
MA	9"	25 eels/person/day	Nets, pots, traps, spears, and angling only; seasonal gear restrictions and mesh requirements. Bait limit of 50 eels/day for party/charter boat captain and crew.
RI	9"	25 eels/person/day	Bait limit of 50 eels/day for party/charter boat captain and crew.
CT	9"	25 eels/person/day	
NY	9"	25 eels/person/day	Maximum limit of 14" in some rivers. Bait limit of 50 eels/day for party/charter boat captain and crew.
NJ	9"	25 eels/person/day	Bait limit of 50 eels/day for party/charter boat captain and crew. Mesh size restriction on pots.
PA	9"	25 eels/person/day	Gear restrictions.
DE	9"	25 eels/person/day	Two pot limit/person.
MD	9"	25 eels/person/day	Gear restrictions.
DC	9"	10 eels/person/day	
PRFC	9"	25 eels/person/day	

VA	9"	25 eels/person/day	Recreational license. Two pot limit. Mandatory monthly catch report. Gear restrictions. Bait limit of 50 eels/day for party/charter boat captain and crew.
NC	9"	25 eels/person/day	Gear restrictions. Non-commercial special device license. Two eel pots allowed under Recreational Commercial Gear license. Bait limit of 50 eels/day for party/charter boat captain and crew.
SC	9"	25 eels/person/day	Gear restrictions. Permits and licenses. Two pot limit.
GA	9"	25 eels/person/day	
FL	9"	25 eels/person/day	Gear restrictions. Wholesale/retail purchase exemption applies to possession limit for bait.

* For specifics on licenses, gear restrictions, and area restrictions, please contact the individual state.

IV. Status of Research and Monitoring

The FMP requires states and jurisdictions with a declared interest in the species to conduct an annual YOY survey to monitor annual recruitment of each year's cohort. In 2015, the states of Maine (West Harbor Pond), New Hampshire (Lamprey River), New Jersey (Patcong Creek), Delaware (Millsboro Pond), and Maryland (Turville Creek) had above average YOY counts. The 2016 catch at Maine's West Harbor Pond site was the third largest catch on record. The 2016 catch at New Hampshire's Lamprey River site was similarly the third highest in the time series. The 2016 catch at New Jersey's Patcong Creek site was the sixth highest in the 15 year time series. The 2016 catch at Delaware's Millsboro Pond was the sixth highest in the 17 year time series. The 2016 CPUE at Maryland's Irish elver ramp on Turville Creek was above average. All other states with YOY surveys (Massachusetts-New York, PRFC, South Carolina, and Florida) had below average survey counts. Pennsylvania, D.C., North Carolina, and Georgia do not have YOY surveys, but instead have yellow eel surveys. The results from Virginia's YOY surveys are forthcoming. North Carolina is relying solely on NOAA's Beaufort Bridgenet Ichthyoplankton Sampling Program (BBISP) to develop a YOY abundance index for American eel. The program is currently backlogged, but sampling is continuing and funds have been secured to process the newly generated backlog, as well as samples through 2019. New Jersey additionally developed and implemented a fishery-independent eel pot survey to collect abundance data of yellow American eels within nursery grounds. This survey, which began in 2015, supplements the current glass eel survey by sampling more life stages and will allow biologists to collect additional biological samples (age-length-weight data).

As required by Addendum IV, Maine initiated a fishery independent life cycle survey covering glass, yellow, and silver eels within at least one river system in 2016.

North Carolina's aquaculture plan for an American Eel Farm was approved for 2016, and they were given a quota of 200 pounds of glass eel, though they caught 0 pounds in the 2016 fishery.

The FMP does not require any other research initiatives in participating states and jurisdictions. Nonetheless, the American Eel TC has identified several research topics to further understanding of the species' life history, behavior, and biology. Research needs for American eel include:

High Priority

- Accurately document the commercial eel fishery to understand participation in the fishery and the amount of directed effort.
- Investigate, develop, and improve technologies for American eel passage upstream and downstream at various barriers for each life stage. In particular, investigate low-cost alternatives to traditional fishway designs for passage of eel.
- Formulate a coastwide sampling program for yellow and silver American eels using standardized and statistically robust methodologies.
- Conduct regular periodic stock assessments and establish sustainable reference points for eel to develop a sustainable harvest rate and to determine whether the population is stable, decreasing, or increasing.
- Research the effects of the swim bladder parasite *Anguillacolla crassus* on the American eel's growth and maturation, migration to the Sargasso Sea, and spawning potential.
- Evaluate the impact, both upstream and downstream, of barriers to eel movement with respect to population and distribution effects. Determine relative contribution of historic loss of habitat to potential eel population and reproductive capacity.

Medium Priority

- Investigate survival and mortality rates of different life stages (leptocephalus, glass eel, yellow eel, and silver eel) to assist in the assessment of annual recruitment. Continuing and initiating new tagging programs with individual states could aid such research.
- Tagging Programs: A number of issues could be addressed with a properly designed tagging program. These include:
 - Natural, fishing, and/or discard mortality; survival
 - Growth
 - Validation of aging method(s)
 - Reporting rates
 - Tag shedding or tag attrition rate
- Research contaminant effects on eel and the effects of bioaccumulation with respect to impacts on survival and growth (by age) and effect on maturation and reproductive success.
- Investigate fecundity, length, and weight relationships for females throughout their range; growth rates for males and females throughout their range; predator-prey relationships; behavior and movement of eel during their freshwater residency; oceanic behavior, movement, and spawning location of adult mature eel; and all information on

the leptocephalus stage of eel.

- Assess characteristics and distribution of eel habitat and the value of habitat with respect to growth and sex determination.
- Identify triggering mechanism for metamorphosis to mature adult, the silver eel life stage, with specific emphasis on the size and age of the onset of maturity, by sex. A maturity schedule (proportion mature by size or age) would be extremely useful in combination with migration rates.

Low Priority

- Perform economics studies to determine the value of the fishery and the impact of regulatory management.
- Review the historic participation level of subsistence fishers in wildlife management planning and relevant issues brought forth with respect to those subsistence fishers involved with American eel.
- Examine the mechanisms for exit from the Sargasso Sea and transport across the continental shelf.
- Research mechanisms of recognition of the spawning area by silver eel, mate location in the Sargasso Sea, spawning behavior, and gonadal development in maturation.
- Examine age at entry of glass eel into estuaries and fresh waters.
- Examine migratory routes and guidance mechanisms for silver eel in the ocean.
- Investigate the degree of dependence on the American eel resource by subsistence harvesters (e.g., Native American Tribes, Asian and European ethnic groups).
- Examine the mode of nutrition for leptocephalus in the ocean.
- Provide analysis of food habits of glass eel while at sea.

V. Status of Management Measures and Issues

The FMP required that all states and jurisdictions implement an annual YOY abundance survey by 2001 in order to monitor annual recruitment of each year's cohort. Addendum III requires a 9 inch minimum size restriction in the commercial and recreational yellow eel fisheries, as well as the use of ½ by ½ mesh in the commercial yellow eel pot fishery. The recreational bag limit is 25 fish/angler/day, and the silver eel fishery is restricted, as is the development of pigmented eel fisheries.

Proposed Endangered Species Act Listing of American Eel

The US Fish and Wildlife Service (USFWS) reviewed the status of American eel in 2007 and found that, at that time, protection under the Endangered Species Act was not warranted. American eel was later petitioned for listing as threatened under the Endangered Species Act (ESA) in April 2010 by the Center for Environmental Science, Accuracy, and Reliability (CESAR, formally the Council for Endangered Species Act Reliability). The USFWS published a positive 90 day finding on the petition in September 2011, acknowledging that the petition may be warranted and that a status review would be conducted. CESAR filed a lawsuit in August 2012 against the USFWS for failure to comply with the statutes of the ESA, which specifies a proposed rule based on the status

review be published within one year of the receipt of the petition. A Settlement Agreement was approved by the court in April 2013, which required the USFWS to publish a 12-month finding by September 30, 2015. In the published finding, the USFWS determined that a listing under the ESA was not warranted.

VI. Current State-by-State Implementation of FMP Compliance Requirements

The PRT reviewed the state compliance reports for 2015. The PRT notes the following changes with states implementing the required provisions of the American Eel Fishery Management Plan:

Silver Eel Fishery Measures:

- Florida does not have a regulation preventing harvest of eels from pound nets from September 1 through December 31, but the state is unaware of any active pound net fishery in the past 10-15 years.

Reporting Measures:

- New Hampshire and New Jersey do not have dealer reporting, but harvesters report some information on dealers. Delaware, the Potomac River Fisheries Commission, and Florida do not have dealer reporting.

In addition to the monitoring program changes implemented with Addendum III and Addendum IV, the following changes were made to the YOY survey in 2016:

- Maine – The state initiated the required eel life cycle study in 2016.
- New Hampshire – An Irish elver trap was installed on the Lamprey River and a box trap was installed on the Oyster river in order to expand the YOY monitoring program. Sampling occurred on the Oysters River in 2014, 2015, and 2016, and on the Lamprey River since 2001.
- Maryland – Trap functionality and efficiency has been affected at Maryland’s Bishopville prong by the removal of the Bishopville dam in 2014. Maryland made several modifications to traps at the site in 2016, including the addition of both an attraction sprayer and a second intake hose, but observed limited success.
- South Carolina – The state transitioned to using eel ramps for the 2016 survey, as opposed to the stake fyke-net gear used in previous years.

Section 4.4.2 of the FMP stipulates that states may apply for *de minimis* status for each life stage if (given the availability of data), for the preceding two years, their average commercial landings (by weight) of that life stage constitute less than 1% of the coastwide commercial landings for that life stage for the same two-year period. States meeting this criterion are exempted from having to adopt commercial and recreational fishery regulations for a particular life stage listed in Section 4 and any fishery-dependent monitoring elements for that life stage listed in Section 3.4.1.

Qualification for *de minimis* is determined from state-reported landings found in compliance

reports. In 2016, New Hampshire, Massachusetts, Pennsylvania, South Carolina, Georgia, and Florida requested *de minimis* status for their yellow eel fisheries. All states that applied for *de minimis* of the yellow eel fishery meet the *de minimis* criteria. The state of South Carolina additionally requested *de minimis* status for its glass eel fishery, but does not meet the 1% landings criteria for this life stage.

The District of Columbia has traditionally been granted *de minimis* status in this fishery; however, D.C. has not submitted a compliance report for 2016. While there is no active fishery for American eel, D.C. conducts a yellow eel survey each year, and the survey results need to be passed on the Stock Assessment Subcommittee.

VII. Recommendations/Findings of the Plan Review Team

1. The PRT recommends the Board consider state compliance issues as detailed in Section VI.
2. The PRT recommends *de minimis* be granted to New Hampshire, Massachusetts, Pennsylvania, South Carolina, Georgia, and Florida for their yellow eel fisheries.
3. The PRT requests that the Board reevaluate the requirement that states provide estimates of the percent of harvest going to food versus bait, as there is a high level of uncertainty and subjectivity inherent in the data.
4. The PRT requests that states work with the law enforcement agencies to include information on any confiscated poundage from illegal or undocumented fisheries, and that the Board continue to encourage interstate enforcement actions with regards to poaching, due to the broad geographic scale at which the issue occurs.
5. The PRT requests that New York separate its yellow and silver eel landings, if possible, when reporting harvest.
6. The PRT recommends the Board investigate whether North Carolina's American Eel Farm source its glass eels solely from North Carolina waters, as a recent article in the Outer Banks Times indicated the Farm was importing eel from nearby states.
7. The PRT requests that states quantify upstream and downstream passage at blockages, if possible, and provide the information to the Technical Committee for evaluation.

VIII. Works Cited

Atlantic States Marine Fisheries Commission (ASMFC). 1998. Interstate Fishery Management Plan for American Eel (*Anguilla rostrata*). Washington D.C. NOAA Oceanic and Atmospheric Administration Award No. NA97 FGO 0034 and NA07 FGO 024.

Atlantic States Marine Fisheries Commission (ASMFC). 2012. American Eel Benchmark Stock Assessment. Arlington, VA.

Atlantic States Marine Fisheries Commission (ASMFC). 2017. American Eel Stock Assessment Update. Arlington, VA.